

201-14922A

HIGH PRODUCTION VOLUME (HPV)

CHALLENGE PROGRAM

TEST PLAN

For

**Phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine
(CAS No. 67763-14-8)**

**Prepared by
The American Chemistry Council
Petroleum Additives Panel
Health, Environmental, and Regulatory Task Group**

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**LIST OF MEMBER COMPANIES IN THE
HEALTH, ENVIRONMENTAL AND REGULATORY TASK GROUP**

The Health, Environmental, and Regulatory Task Group (HERTG) of the American Chemistry Council Petroleum Additives Panel includes the following member companies:

Chevron Oronite Company, LLC

Crompton Corporation

Ethyl Corporation

ExxonMobil Chemical Company

Ferro Corporation

Groupe SNPE

Infineum

The Lubrizol Corporation

Rhein Chemie Corporation

Rhodia, Inc.

1.0 INTRODUCTION

In March 1999, the American Chemistry Council (formerly the Chemical Manufacturers Association) Petroleum Additives Panel Health, Environmental, and Regulatory Task Group (HERTG), and its participating member companies committed to address certain chemicals listed under the Environmental Protection Agency (EPA) High Production Volume (HPV) Chemical Challenge Program. This test plan follows up on that commitment.

Specifically, this test plan sets forth how the HERTG intends to address testing information for the following substance:

- Phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine (CAS No. 67763-14-8)

This document indicates the findings of the data review process, and sets forth a proposed test plan to satisfy parts of the required test battery for endpoints without data that would be considered adequate under the program.

In preparing this test plan the following steps were undertaken:

Step 1: A review of the literature and confidential company data was conducted on the physicochemical properties, mammalian toxicity endpoints, and environmental fate and effects for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine, using its CAS number, CAS name, and synonyms. Searches included the following sources: MEDLINE, BIOSIS, CANCERLIT, CAPLUS, CHEMLIST, EMBASE, HSDB, RTECS, EMIC, TOXLINE, TSCATS databases as well as standard handbooks and databases (e.g., SAX, CRC Handbook on Chemicals, IUCLID, Merck Index).

Step 2: The compiled data were evaluated for adequacy in accordance with the EPA guidance documentation.

2.0 GENERAL SUBSTANCE INFORMATION

The substance that is the subject of this test plan is used as a petroleum additive in petroleum base stocks. The chemical name, CAS Registry Number, molecular weight and chemical structure for this substance are presented below.

Chemical Name: Phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine

Chemical Synonyms:

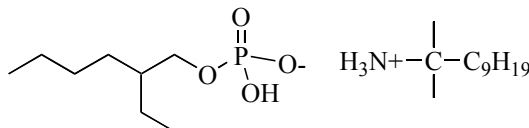
- 2-Ethylhexyl dihydrogen phosphate, compound with tert-dodecylamine
- Mono (2-ethylhexyl) phosphate tert-dodecylamine salt

Chemical Abstract Service Registry Number: 67763-14-8

Molecular formula: $C_{12}H_{27}N.xC_8H_{19}O_4P$

Molecular Weight Range: 395 gm/mol

Chemical Structure:



May also contain C_{14} alkyl amine

3.0 EXPOSURE INFORMATION

Manufacture

This material is prepared by reacting phosphorous pentoxide with 2-ethylhexanol under controlled conditions to yield approximately 55-65 wt% of a phosphoric acid, mono (2-ethylhexyl) ester [CAS 1070-03-7] and 35-45 wt% of a phosphoric acid, bis (2-ethylhexyl) ester [CAS 298-07-7]. The mono- and di- alkyl phosphate esters are then reacted with a mixture of a C_{12} to C_{14} tertiary alkyl amine to yield approximately 50-60 wt% of the phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] and 30-40 wt% of the phosphoric acid, bis (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 68155-99-7] and 5-15 wt% residual tertiary alkyl amine. As manufactured, this resulting reaction product remains a physical mixture of the mono- and di- alkyl phosphate ester tertiary alkyl amine salts and residual tertiary alkyl amine.

Use

Phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] in a mixture with phosphoric acid, bis (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 68155-99-7] are used to formulate finished automotive and industrial gear oils. These gear lubricants are intended for application in enclosed gear sets operating under heavy or shock loads. In these applications, it is used in combination with other additives to provide antiwear and friction-reducing characteristics and help minimize the temperature rise in heavily loaded gear sets.

In gear oil additive packages, the mono- and di- alkyl phosphate ester tertiary alkyl amine salts and residual tert-alkylamine are typically blended at concentrations of 10-20 wt.% [i.e., 6-12 wt% mono- and 4-8 wt% di- alkyl phosphate ester tert-alkyl amine salts] with approximately 55-60 wt% of a highly refined lubricating base oil and other additives. These gear oil additive packages are generally sold to finished gear lubricant blenders that will typically formulate automotive gear oils with 4.0-7.5 wt% and industrial gear oils with 1.0-2.5 wt% of the additive package in a highly refined petroleum basestock. Therefore, finished automotive gear oils will typically contain concentrations of 0.24-0.9%

mono- and 0.16-0.3 wt% di- alkyl phosphate ester tert-alkyl amine salts, while finished industrial gear oils will contain anywhere from 0.06-0.3 wt% mono- and 0.04-0.2 wt% di- alkyl phosphate ester tert-alkyl amine salts.

4.0 PHYSICOCHEMICAL PROPERTIES

4.1 Summary of Available Data

No adequate published or unpublished physical/chemical properties data were located for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8].

4.2 Data Assessment and Test Plan for Physicochemical Properties

Boiling point, vapor pressure, water solubility and octanol/water partition coefficient will be evaluated for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8].

Although no HPV test data are available for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8], after all company and consortia HPV test plans are submitted to EPA and posted for public comment and before any biological or environmental toxicological testing is initiated, the HERTG will evaluate available test data and proposed testing on similar chemicals which could be extrapolated for use in this test plan.

5.0 ENVIRONMENTAL FATE DATA

The environmental fate of a substance and its degradation by-products, including their partitioning among environmental compartments, are dependent on the physicochemical properties. The important environmental degradation pathways for lubricant additives are biodegradation, hydrolysis, and photodegradation.

5.1 Biodegradability

5.1.1 Summary of Available Data

No adequate published or unpublished biodegradation studies were located for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8].

5.1.2. Data Assessment and Test Plan for Biodegradability

Phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] will be evaluated for biodegradability.

5.2 Hydrolysis

5.2.1 Summary of Available Data

No adequate published or unpublished studies on hydrolysis for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] were located.

5.2.2 Data Assessment and Test Plan for Hydrolysis

Hydrolysis will be evaluated..

5.3 Photodegradation

5.3.1 Summary of Available Data

No adequate published or unpublished studies on photodegradation for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] were located.

5.3.2 Data Assessment and Test Plan for Photodegradation

The Atmospheric Oxidation Potential (AOP) of this substance will be characterized using the modeling program AOPWIN.

5.4 Fugacity Modeling

5.4.1 Summary of Available Data

No published or unpublished studies on fugacity-based multimedia fate modeling studies for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] were located.

5.4.2 Test Plan for Fugacity

The relative distribution of phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] will be evaluated using Level I Fugacity modeling.

6.0 ECOTOXICOLOGY DATA

6.1 Aquatic Toxicity

6.1.1 Summary of Available Data

No adequate published or unpublished ecotoxicity studies on the effects of phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] for fish, invertebrates, and algae were located.

6.2.2 Data Assessment and Test Plan for Acute Aquatic Toxicity

Aquatic toxicity in fish, invertebrates, and algae will be evaluated.

7.0 MAMMALIAN TOXICOLOGY DATA

7.1 Acute Mammalian Toxicity

7.1.1 Summary of Available Data

No adequate published or unpublished acute toxicity studies of neat phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] were located.

7.1.2 Data Assessment and Test Plan for Acute Mammalian Toxicity

Acute toxicity will be evaluated.

7.2. Mutagenicity

7.2.1 Summary of Available Data

No adequate published or unpublished Bacterial Reverse Mutation studies and chromosomal aberration studies for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] were located.

7.2.2 Data Assessment and Test Plan for Mutagenicity Toxicity

Mutagenicity will be evaluated.

7.3 Repeated-dose, Reproductive and Developmental Toxicity

7.3.1 Summary of Repeated-Dose Toxicity Data

No adequate published or unpublished studies on the repeated dose toxicity of phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] were located.

In addition, no adequate published or unpublished reproductive or developmental toxicity tests for phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8] were located.

7.3.2 Data Assessment and Test Plan for Repeated-dose Toxicity

Repeated dose toxicity and reproduction/development toxicity will be evaluated.

SUMMARY

The following table summarizes the available data and proposed toxicity evaluations of phosphoric acid, mono (2-ethylhexyl) ester, compound with tert-dodecanamine salt [CAS 67763-14-8].

Table 1
Summary Table of Available Data and Proposed Toxicity Evaluations of
Phosphoric acid, mono (2-ethylhexyl) ester, compound with
tert-dodecanamine salt [CAS 67763-14-8]

CAS No.: 67763-14-8	Study Results	Evaluations Proposed
Physical/Chemical Characteristics		
<i>Melting Point</i>	No Adequate Data Located	Yes
<i>Boiling Point</i>	No Adequate Data Located	Yes
<i>Vapor Pressure</i>	No Adequate Data Located	Yes
<i>Water Solubility</i>	No Adequate Data Located	Yes
<i>Partition Coefficient</i>	No Adequate Data Located	Yes
Environmental Fate		
<i>Biodegradation</i>	No Adequate Data Located	Yes
<i>Hydrolysis</i>	No Adequate Data Located	Yes
<i>Photodegradation</i>	No Adequate Data Located	Yes
<i>Fugacity</i>	No Adequate Data Located	Yes
Ecotoxicity		
<i>Acute Toxicity to Fish</i>	No Adequate Data Located	Yes
<i>Acute Toxicity to Invertebrates</i>	No Adequate Data Located	Yes
<i>Acute Toxicity to Algae</i>	No Adequate Data Located	Yes
Mammalian Toxicity		
<i>Acute Toxicity</i>	No Adequate Data Located	Yes
<i>Repeated Dose Toxicity</i>	No Adequate Data Located	Yes
<i>Reproductive Toxicity</i> <i>Developmental Toxicity</i>	No Adequate Data Located	Yes
Genotoxicity		
<i>Gene Mutation</i>	No Adequate Data Located	Yes
<i>Chromosomal Aberration</i>	No Adequate Data Located	Yes